SHIP PRODUCTION COMMITTEE
FACILITIES AND ENVIRONMENTAL EFFECTS
SURFACE PREPARATION AND COATINGS
DESIGN/PRODUCTION INTEGRATION
HUMAN RESOURCE INNOVATION
MARINE INDUSTRY STANDARDS
WELDING
INDUSTRIAL ENGINEERING
EDUCATION AND TRAINING

June 1976
NSRP 0002

THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

Proceedings of the REAPS Technical Symposium

Paper No. 22:
Hull System at Italcantieri Company

U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
JUN 1976	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
The National Shipbuilding Research Program: Proceedings of the REAPS Technical Symposium Paper No. 22: Hull System at Italcantieri Company	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Naval Surface Warfare Center CD Code 2230 - Design Integration Tools Building 192, Room 128 9500 MacArthur Blvd Bethesda, MD 20817-5700**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**SAR**	**18**	

DISCLAIMER

These reports were prepared as an account of government-sponsored work. Neither the United States, nor the United States Navy, nor any person acting on behalf of the United States Navy (A) makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness or usefulness of the information contained in this report/ manual, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or (B) assumes any liabilities with respect to the use of or for damages resulting from the use of any information, apparatus, method, or process disclosed in the report. As used in the above, “Persons acting on behalf of the United States Navy” includes any employee, contractor, or subcontractor to the contractor of the United States Navy to the extent that such employee, contractor, or subcontractor to the contractor prepares, handles, or distributes, or provides access to any information pursuant to his employment or contract or subcontract to the contractor with the United States Navy. ANY POSSIBLE IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR PURPOSE ARE SPECIFICALLY DISCLAIMED.

IITRI

Proceedings of the REAPS Technical Symposium June 15-16, 1976 Atlanta, Georgia

Research and
Engineering for
Automation and
Productivity in
Shipbuilding

IIT RESEARCH INSTITUTE
10 WEST 35 STREET
CHICAGO, ILLINOIS 60616

HULL SYSTEM AT ITALCANTIERI COMPANY

1) INTRODUCTION

ITC is an old AUTOKON user, as reported in the previous meetings.

Apart from PRELIKON, all the other modules have been largely used in the last eight years.

To complement the functions which are not furnished by A.1, ITC has developed a system, named SCAFO, that solves all the problems related to the shell structures and some related to the internal panelling.

It includes the following modules:

- Frame Table definition
- Primary Inner Structures Loading (panels)
- Shell Landing
- Primary I Structures Landing
- Section Drawing
- Table of Detail (interface SCAFO - Al)
- Body and Shell Expansion Plan drawing
- Shell Expansion
- Templates
- Long. Frame and Transv. Frame expansion (interface SCAFO - Al)
- Jigs, block marking and controlling data
- Bevels offset
- Painting Lines Heights
- Draft Marks

General Base List

In addition to the above principal modules, other programs are available; they give us offset tables for frames, decks, longitudinals and other structures. This system and a large library of A. 1 norms gave us the opportunity of merging Mould Loft and

ptical Division with Technical Division. The former were previously in the yards and the latter at Headquarters.

The scale 1:10 was not introduced in the new procedure. Body plans, pieces, nestings and others, are drawn out in scale 1:20. A complete body plan in scale 1:10 is sent to the yard just for checking purposes.

2) FUTURE IMAGE OF FULL SYSTEM BASED ON A74

Though A.1 and other modules are working at a good level, they cannot handle automation in the design phase. Drawings with prevailing automatic operation are not possible.

ALKON language and its properties are oriented to solve, quite automatically, such lacking capabilities of A.1. Data base management system provides the necessary tool.

For the time being we are revising the old norms with the ALKON language. They are handled to avoid duplication with A74 basic norms. Courses are scheduled to prepare people in using the language. We'll start with A74 in June 76 with a new cargo ship.

At the same time we have to convert some utility programs working between the SCAFO system and A.1.

Why SCAFO system and not LANSKI and related programs ? After we compared the two, as to number of modules, output quality and computer time, we decided to go on with ours.

Even if it works on a separate data base it brings about much reduction of data volume, and it allows easy maintenance in case of design alterations.

SCAFO data base file organization is made by the catalogue method and the access is random. The data are stored as a form of input image, net intersection ordinates.

According to the experience we have gained on this aspect of ship building we shall give some notes and suggestions that may be worthy of attention.

LANSKI and related modules are not developed according to a unique vision. Different commands and ways of retrieving data may cause some misunderstanding.

LANSKI

The command [illegible] or others, should include also structures such as margin plates, not parallel to the global planes or ship axis.

Scantling of longitudinals must be stored only once, and it should not be redefined in other modules (See LFRAME),CUTO type should be given along the structure as a group and not along the longitudinal.

In drawing a body plan, profile contour with its true length and face plate deviation should be available. (See fig.1).

SHEEL

Output should give us further information about the shape, so that rolling, bending and heating operations may be valuable.

Welding shrinkage should be included.

Marking contour refer to template position only (if requested).

Diagonal or other tables to check, after bending, very shaped plates.

LFRAME

The module should include also transverse frame because the same operations are performed in the workshop.

Referring to LANSKI notes, scantling and neutral axis should be picked-up automatically from D.B. Table of length along the shell should be calculated also for the raw profile before bending.

J I G S

Too much complex input data compared with a very poor output. High computer time.

Further data must be read from other outputs. According to us you need further information to perform the following operations in building blocks:

- Shell plates lying
- Panel marking or checking (See fig.2)
- Longit. and frames inclination
- General checking of boundary (seams,butts) orientation of big structures (by means of theodolite)
- Main references in the dock position.

NESTING AND GENERAL BASE LIST

At present ITC is trying to reduce its operation time in NESTING by means of interactive method with UNIVAC APAGE; the necessary hardware and software should be available during the months. A group is carrying out the program connected with this side of part coding.

ITC is also working on a system concerning the general base list. Input data have to be prepared from structure data base. Through these output lists, manufacturing information as material handling and naval shop works are obtained.

Until now, we have not examined Aker's norms.

As we know, the package would give us further possibilities in design phase and as a consequence in part Coding.

Bearing above matters and introduction of A74 in mind, we will have to contemplate the future image of the new integrated system in addition to the working modules.

i) A new module should solve and transfer, into A74 data base, the Primary Inner Structures (may be in an input image), as well as TRABO transfer the body plain.

2) The wire model referring to such structures should be available automatically.

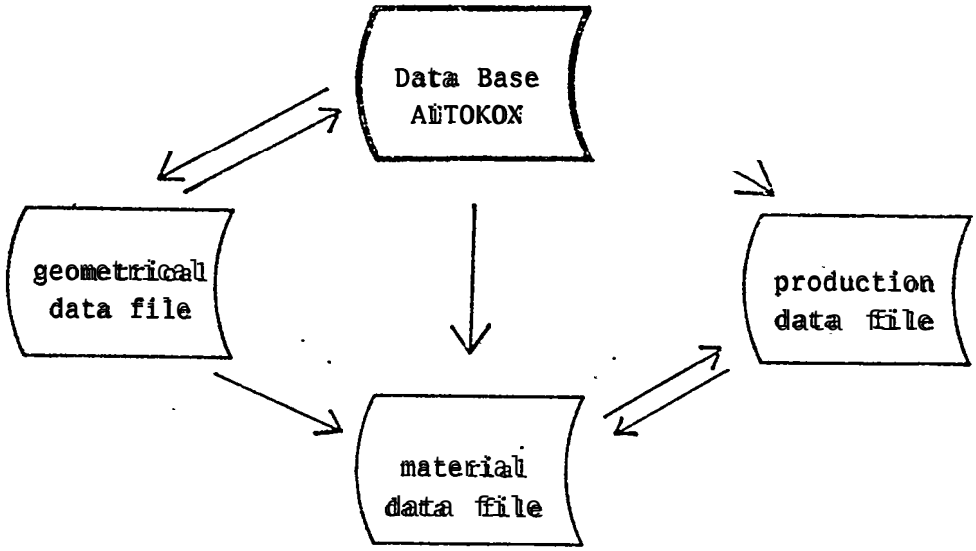
3) Part identification code system will be one of the most effective and useful methods, so that it can reduce manual input data for general base list, and interactive NESTING operations in piece retrieval would be quite automatic.

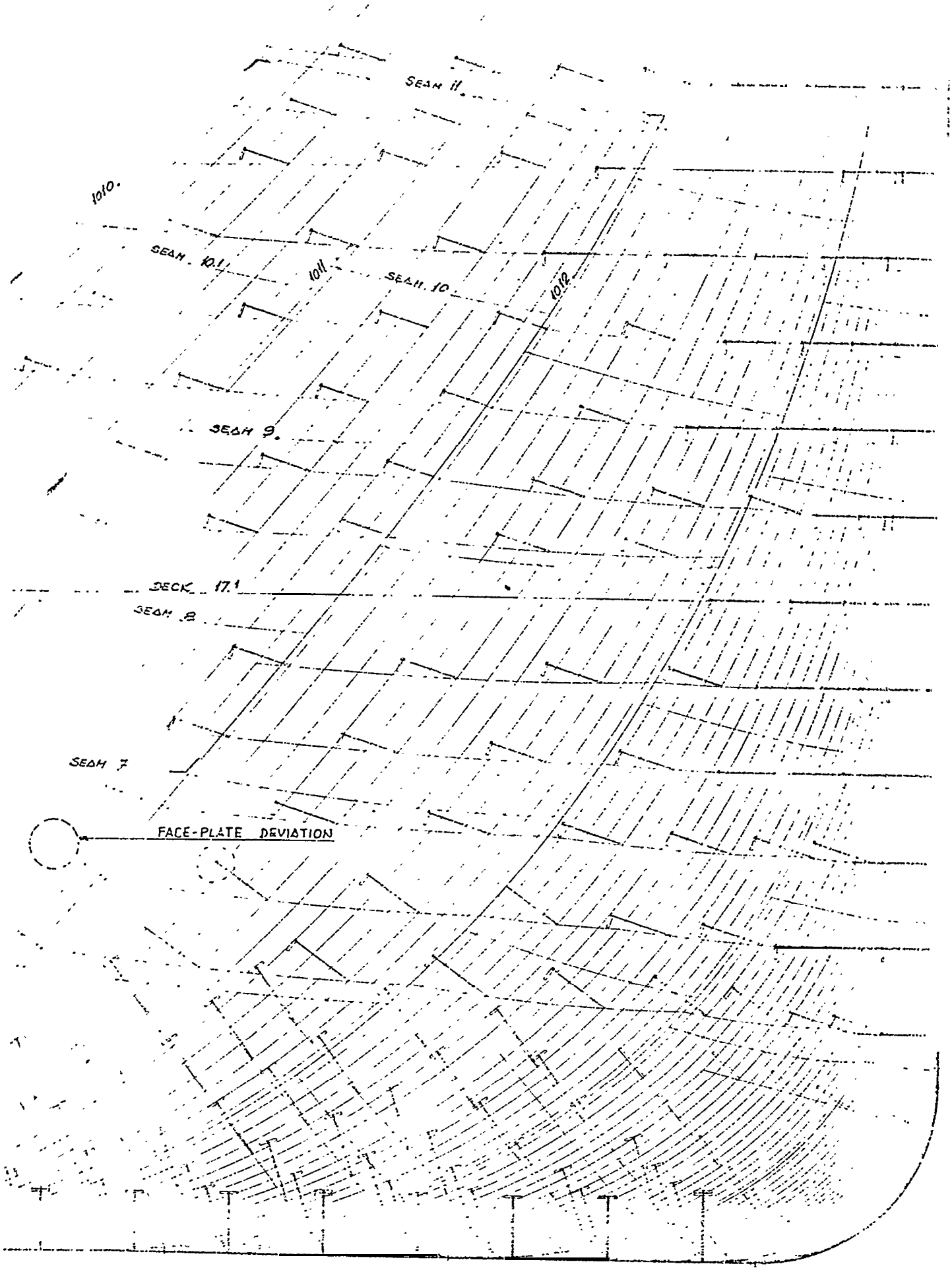
The characteristics of the data to be used in the integrated Hull System should be as follows :

- Geometrical data — SCAFO data file
- Design definition data)
- Parts data
- Piece list data — AUTOKON, data base
- Nesting data

- Data for production — Production data file
- Material data — Material data file

An illustration of the relationship of data files in the integrated Hull System in I.T.C. may be as follows.



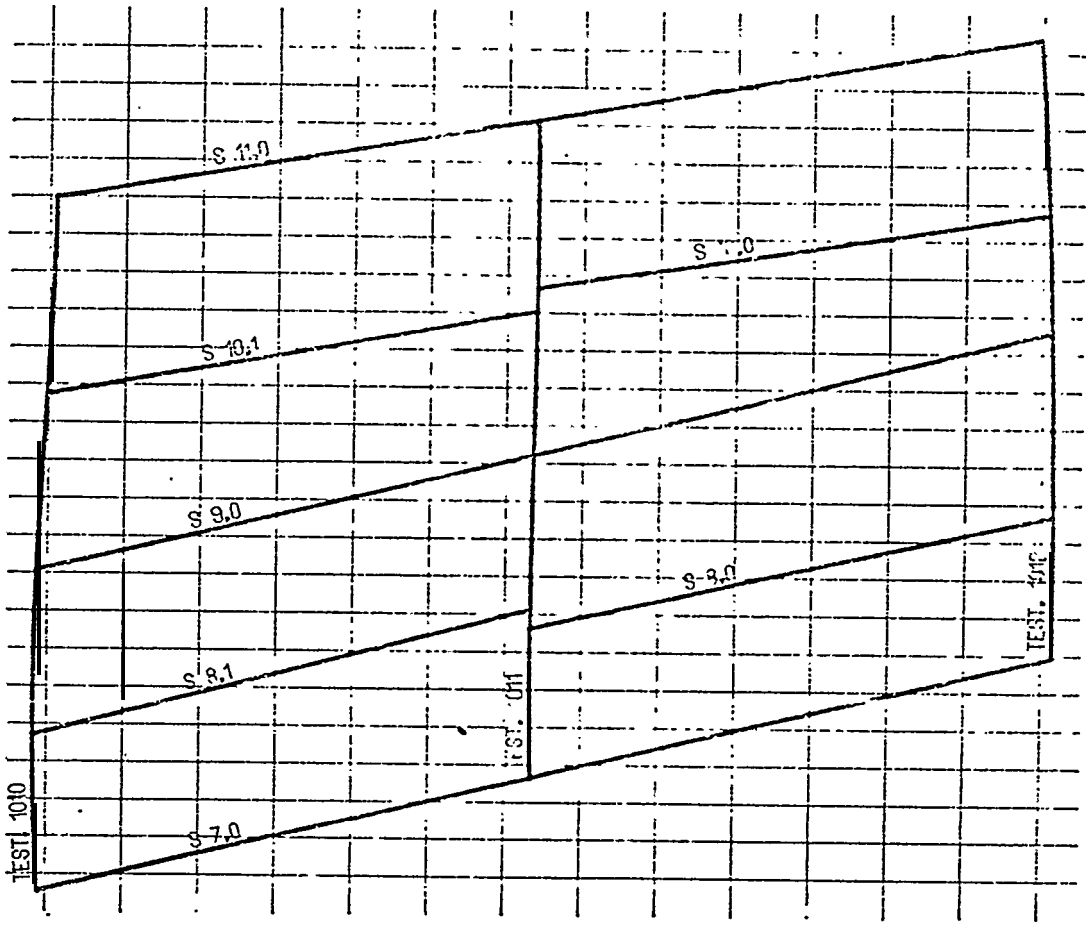


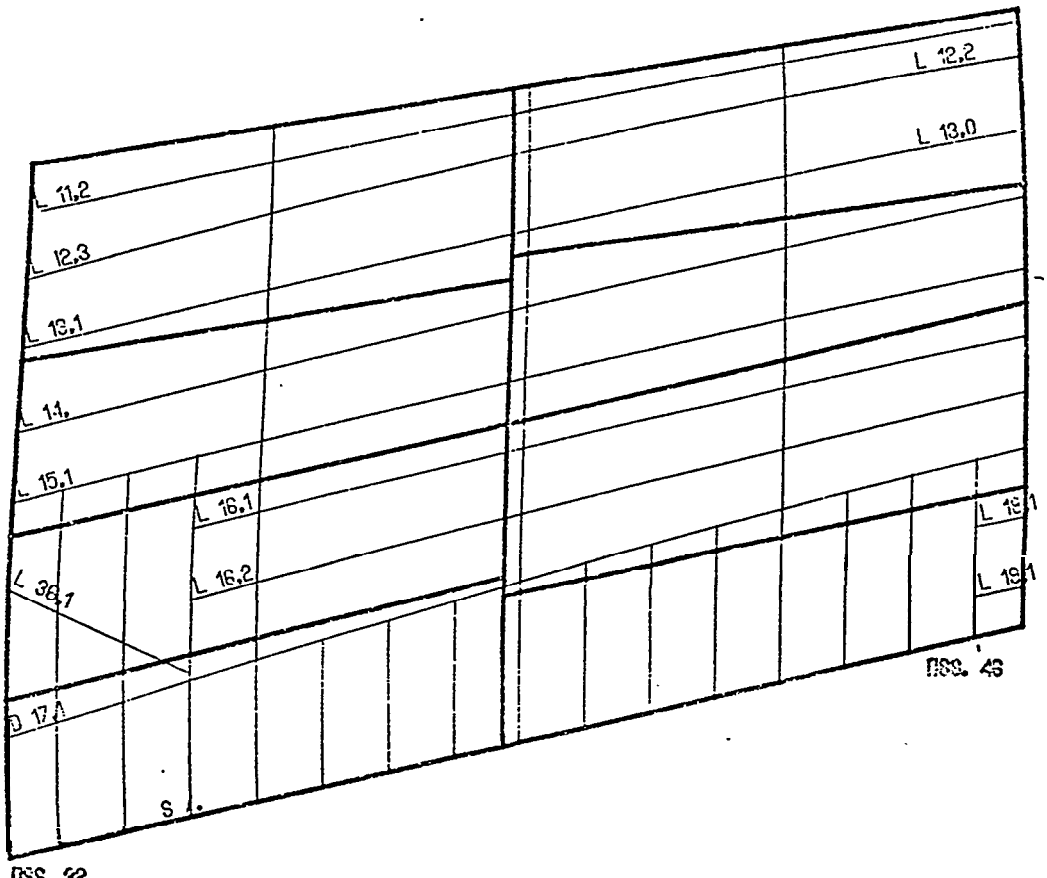
COMPLETED BODY-PLAN fig n.1

ITC.

BLOCCO FG32/6

SCALA 1/ 100





BUILDING BLOCK ON PLATTFORM

3) EXPERIENCES AND FIRST APPROACH WITH THE A74 MODULES

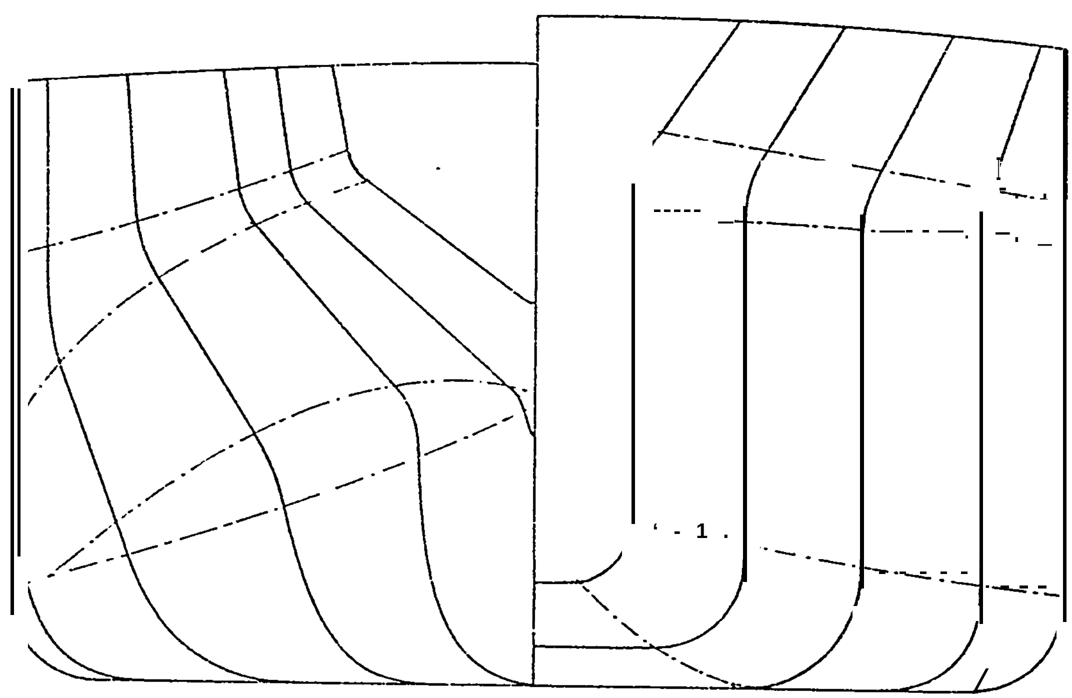
FAIR module

FAIR module has been largely used by ITC both for its own ships and those of other yards.

Services for other yards cover fairing and shell structure. The enclosed tables illustratc what has been done in the last seven years . (See tables 1,2).

ITC ships have been treated partially or completely with the other A.1 modules too. From 1972 on, the entire shell area (excluding verY shaped stern and stem) is processed by SCAFO system.

By reference to the tables it is brought to mind that in helping the FAIR module we developed some auxiliary programs because some bodies had particular geometrical lines, as follows :



In such types of forms the final body plan is stored both by [illegible]RISS via [illegible] and [illegible]GEO1 via output from the mentioned programs. The tables give us further information about the times re-

The ending area of those marked by a star were corrected manually in the mould loft or tec.div. and man hours are not included in the table.

After such corrections, we used to run fairing again,so that we stored the right moulded lines.

Such procedure occurs only for our own ships.

FairinG operations

Usually fairing operations are handled by the men. Both afterbody and fore body are treated at the same time.

We try to have the preliminary completed body plan as soon as possible.

It is unimportant whether it is very well faired or not. Anyway enough as a support for design purposes and shell landing.

Our shell landing method requires butts, too.

Modified FAIR 2

FAIR2 module was modified because of the following limitations:

- Fraction numbe.r 3 and .6 not possible
- Low value as a maximum proper frame number (250)
- Prcblems by using TRABO

The new module requires only one card after TFRS command with the first and the last frame number.

All the other,fraines, stations and butts included are retrieved from SCAFO D.B. as well as absolute distances.

Routines STARTS, GLASPS, FINNES were modified. New routine TFFAIR was included. The module can work both in the original and new version.

Recently we have faired two ferries-Part coding is carried out by A.l.

A74 capabilities help to generate transverse frame contours

for the boss of the stem area. Procedures were as follows :

- Body plan obtained by FAIR2
- Generation of new contour according to the boss of the stem by means of A74 ALKON
- Transferring of frames from A74 D.B. to A1 D.B.
  (See fig. n.3)

Trieste, 12/2/76

BODY PLANS FAIRED BY ITC

	Company	Date	yn	Type of ship	AFTBODY days	AFTBODY hours	AFTBODY runs	AFTBODY tfrs	FOREBODY days	FOREBODY hours	FOREBODY runs	FOREBODY tfrs	Comment
	TTC	GEN 69	4242	Container	5	80	3	20	8	95	4	26	Faired by SRS ending area modified by ITC
1	ITC	APR 69	4235	TanKcer	18	160	15	164	24	360	30	113	* b
2	ITC	JUL 69	4244	Tanker	20	175	16	1.72	22	320	25	117	* b
3	ITC	OCT 69	4268	Tanker	13	92	13	92	17	188	18	76	* b
4	ITC	APR 70	4275	Drill vessel	11	62	12	65	12	72	14	82	Auxiliary progr. aid
5	ITC	MAR 71	4276	(4235) "					4	30	5	102	Frames spacing mod.
6	ITC	J~L 71	4279	OBO carrier	12	48	9	112	10	64	16	57	* b
7	ITC	AUG 71	/,294	Bulk carrier X 1.2		90	11	107	13	104	14	82	* b
8	ITC	SEP 71	P		17	180	13	48	7	64	6	48	
9	CNR	SEP 71	253	Ore oil carrier	26	249	15	122	12	144	2	87	Auxiliary PGR aid
10	CNR	MAY 72	295	Ferry	17	250	5	58		same shape as AFTB.			Auxiliary PGR aid
11	CNR	JUN72	297		18	1.76	19	63	8	113	'7	75	
12	ITC	JUL 72	4298	Tanker	17	210	13	205	1.4	1.35	8	125	
13	ITC	FEB 73	4304	(4244)					4	26	5	107	Frames spacing mod.
	ITC	FEB 73	4284	(4268)	2	12	2		2	12	2		Butts modified only
14	C:w	APR 73	298		17	240	1.2	78	9	140	6	89	
15	MU G	MAY 73	6920	Refrig. s.	9	L52	7	100	13	196	16	li4	?)

	Company	Date	yn	Type of ship	AFTBODY				FOREBODY				Comment
					days	hours	runs	tfrs	days	hours	runs	tfrs	
16	ITC	JUL 73	4310	Clean p.carrier	13	160	11	85	14	172	14	75	* b
17	ITC	LUG 73	11						3	25	3	70	b Frar.ws spacing md.
18	CNR	AUG 73	279	OBO carrier	18	240	18	98	7	88	3	fi.1	Auxiliary PGR aid
19	ITC	OCT 73	P		7	35	3	48	8	70	9	38	- " -
20	CNR	DEC 73	300		15,	180	17	81	8	140	5	107	
21	ITC	FEB 74	4320	Tanker	11	98	11	89	13	148	13	95	
22	lTC	MAR 74	4326	(4294)					4	25	4	75	b Frames spacing mod.
23	NCA	MAY 74	103		7	110	10	65	9	103	8	76	
24	MUG	JUN 74	1657	(6920)					4	24	5	30	Bulb modified only
25	CNR	SEP 74	255		15	175	13	120	5	78	4	98	Auxiliary PGR aid
26	NCA	OCT 74	105		12	95	13	145	15	180	16	230	b
27	EUROM	FEB 75	96		10	80	12	75	7	105	7	8?	
2.13	CNR	FEB 75	550		17	190	18	60	5	60	6	55	
29	MUG	APR 75	1658	Refrig. s.	8	120	7	100	11	180	13	116	b
30	ITC	JUL 75	4340	FerRy	8	go	9	67	15	130	11	80	* b
31	ITC	CCT 75	4345	Ferry	9	70	11	87	13	112	10	104	* b
32	ITC	OCT 75	4343	Tanker	12	90	10	95	20	160	12	71	* b
33	ITC	GEN 75	4347	Ferry	18	150	8	83					* b